

Mindfulness and Zest for Life Buffer the Negative Effects of Experimentally-Induced Perceived
Burdensomeness and Thwarted Belongingness: Implications for Theories of Suicide

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Abstract

Suicide research can be enhanced by an ability to safely manipulate putative causal variables. The present studies developed an experimental task to modify risk factors identified by the interpersonal theory of suicide (perceived burdensomeness and thwarted belongingness) and examine their hypothesized suppressive effect on persistence in adversity in undergraduate university students. Variables that may moderate the impact of these risk factors on persistence (zest for life and mindful awareness) were incorporated as potential resilience factors. Study 1 ($N = 92$) found elevated burdensomeness and diminished belongingness significantly impaired persistence. Additionally, these predicted effects were moderated by individual differences in zest for life. In Study 2 ($N = 52$), individuals trained in mindfulness prior to the experimental task displayed greater persistence relative to controls. Findings provide experimental support for the role of perceived burdensomeness and thwarted belongingness in the manner predicted by the interpersonal theory, and demonstrate a way to experimentally test the effects of resilience factors that reduce the impact of these interpersonal factors.

General Scientific Summary: The co-occurrence of perceived burdensomeness and thwarted belongingness plays an important role in the onset of suicidal ideation. The current studies (1) experimentally manipulate perceived burdensomeness and thwarted belongingness and reveal outcomes predicted by the interpersonal theory of suicide, and (2) experimentally test the effects of resilience factors that reduce the impact of these interpersonal factors.

Keywords: zest for life, mindfulness, resilience, interpersonal theory of suicide, experimental psychopathology

Mindfulness and Zest for Life Buffer the Negative Effects of Experimentally-Induced Perceived Burdensomeness and Thwarted Belongingness: Implications for Theories of Suicide

Suicide is a leading cause of death worldwide (World Health Organization, 2014).

Factors that increase the risk of suicidal behavior include previous suicide attempts, social isolation, psychiatric illness, hopelessness, unemployment, and family conflict (Chu et al., 2015; Verona et al., 2001), and demographic factors such as being male, belonging to a lower socio-economic group, and being unmarried or divorced (Nock et al., 2008). The interpersonal theory of suicide (Joiner, 2005; Van Orden et al., 2010) provides a causal framework whereby many of these risk factors are thought to influence three key interpersonal constructs underlying proximal risk for suicidal behavior. According to the theory, suicidal desire arises when two fundamental human needs are thwarted: the need to belong (i.e., *thwarted belongingness*); and the need to contribute, manifesting as a perception that one is a burden on others (i.e., *perceived burdensomeness*). The theory also posits that to act on this desire one must have acquired the capability for suicide (i.e., *acquired capability*) by habituating to physical pain and the fear of death. These three constructs are associated with higher risk for suicidal behavior beyond other well-established risk factors (Cero, Zuromski, Witte, Ribeiro, & Joiner, 2015; Christensen, Batterham, Mackinnon, Donker, & Soubelet, 2014; Van Orden, Witte, Gordon, Bender, & Joiner, 2008).

Despite substantial empirical support, evidence for the interpersonal theory to date has two important limitations. First, there is little experimental evidence examining the effects of manipulating its causal constructs. Second, the interpersonal theory, like all theories of suicide (O'Connor & Nock, 2014), focuses more on causal risk factors than on resilience factors that could mitigate the influence of these proximal risk factors on suicidality. One way to overcome

the first limitation is through the use of an experimental task designed to manipulate perceived burdensomeness and thwarted belongingness and measure persistence or behavioral tolerance in the face of these interpersonal factors, with the former being potential, though not sufficient, antecedents of suicide risk. Unlike acquired capability, these interpersonal risk factors vary over time and context and hence are potential candidates for manipulation in a laboratory setting.

Our theoretical rationale for this experimental task follows two lines of reasoning. First, the idea that suicide is the most salient means of *escaping* a life that is deemed intolerable is reflected in a number of prominent theories of suicide. For instance, Baumeister's (1990) escape theory posits that the primary motivation for suicide is to escape from painful self-awareness. Similarly, O'Connor's (2011) Integrated Motivational-Volitional Model of Suicidal Behaviour proposes that defeat and humiliation appraisals give rise to feelings of entrapment, the solution to which is perceived to be escape via suicide. Thus, the desire to escape a situation that has the potential to be appraised as defeating is one important theme. Second, according to Van Orden et al. (2010), suicidality arises when one feels a burden on and lacks meaningful connections to others. Within the context of the interpersonal theory, not giving in to suicidal desire and persisting in the face of interpersonal adversity both require an interpersonal resilience. Thus, a second theme for our experimental task was *persistence* in the face of interpersonal adversity experienced as experimentally induced burdensomeness and diminished belongingness within the context of a team task. Thwarted satisfaction of the fundamental needs for competence and relatedness negatively impact on mental health, ongoing persistence and performance, and can motivate various self-defeating behaviors (Deci & Ryan, 2000) including suicide (Van Orden et al., 2010). Whilst not sufficient, a decline in persistence is a potential antecedent of suicide risk, and the current studies aim to test if, as predicted by the interpersonal theory of suicide,

experimentally induced feelings of burdensomeness and thwarted belongingness decrease persistence and increase the desire to escape in the face of this interpersonal adversity.

In addition to a lack of experimental evidence, a second limitation of suicide research has been its relative neglect of protective or resiliency factors (Kleiman & Beaver, 2013; Klonsky & May, 2015; O'Connor & Nock, 2014). According to the buffering hypothesis (Johnson, Wood, Gooding, Taylor, & Tarrier, 2011), accounting for risk factors alone is insufficient, as suicidal individuals will also have varying degrees of resilience. Rather than representing simply the inverse of risk, factors that confer resilience are proposed to exist on a separate dimension and serve to attenuate the relationship between risk and suicidality. Arguably, only individuals who are both high on risk and low on resilience are likely to engage in suicidal behavior. If resilience does attenuate the relationship between risk and suicidality, accounting for factors that confer resilience may maximize the specificity of any predictive model. To examine a potential role for resilience within the framework of the interpersonal theory, the current studies account for individual differences in one potential suicide resilience factor; zest for life. In Study 1 we examine whether trait-level zest confers resilience against deficits in persistence caused by elevated perceived burdensomeness and thwarted belongingness. In Study 2 we examine whether training in a specific attention regulation strategy confers an *acute* form of resilience that increases persistence in the face of interpersonal adversity, irrespective of whether an individual is high or low on pre-existing resilience, such as zest for life.

Study 1

“Zest for life” represents a will to live that manifests as a sense of engagement with and positive outlook on life. These characteristics have been associated with greater life satisfaction (Park, Peterson, & Seligman, 2004) and lower suicidal ideation (Harrison, Stritzke, Fay, Ellison,

& Hudaib, 2014). The notion that zest for life must be overcome in order for one to act on one's desire for death is already implicit in the interpersonal theory, where it is suggested that perceived burdensomeness and thwarted belongingness may deplete the desire to embrace life over time (Joiner, 2005). Similarly, Shneidman (1996) argued that death-promoting and life-sustaining forces coexist and that the former must overcome the latter. Indeed, there is growing evidence to suggest that life-oriented factors influence the relationship between suicide risk and resilience (e.g., Brown, Steer, Henriques, & Beck, 2005; Harris, McLean, Sheffield, & Jobes, 2010; Harrison et al., 2014; Kleiman & Beaver, 2013; O'Connor et al., 2012). Thus, zest for life may act as a counterbalancing resilience factor that protects against the life-depleting effects of perceived burdensomeness and thwarted belongingness.

While resilience is often viewed as a set of attributes that confer immunity to stressors (Davydov, Stewart, Ritchie, & Chaudieu, 2010), recent literature suggests that the relationship between risk and resilience over time may be multi-faceted. Specifically, resilience may comprise both an ability to tolerate a greater degree of aversive experience without impact on psychological wellbeing (i.e., a *buffering* factor), and an ability to bounce back following emotional and psychological distress (i.e., an *adaptive capacity*; Davydov et al., 2010; Tugade & Fredrickson, 2004). So as well as the ability to *maintain* wellbeing in the face of adversity, resilient individuals may also be better able to *regain* it once it is diminished. Thus, a further aim of the current study was to elucidate these potential different facets of resilience over time.

To achieve the current aims we selected from a sample of university students individuals who were high or low on the proposed suicide resilience factor; zest for life. While university student samples are high functioning, a significant proportion report a history of suicide related behaviors (Bauer, Chesin, & Jeglic, 2014; George, Page, Hooke, & Stritzke, 2016), and this

vulnerability indicates that they are pertinent to the study of suicide risk. We then developed a computerized multi-player team task to induce high or low levels of perceived burdensomeness and thwarted belongingness (PB-TB) and measure their effects on self-reported desire to quit the task, our operationalization of persistence in the face of interpersonal adversity. Given the interpersonal theory posits that the desire to escape from interpersonal adversity arises most strongly when perceived burdensomeness and thwarted belongingness co-exist (Van Orden et al., 2010), we predicted that the dual induction of these constructs would result in greater impairment in persistence relative to a low PB-TB condition where neither was induced.

Guided by the buffering hypothesis and the potential multi-faceted nature of resilience, we identified three possibilities for protective effects of zest for life within the high PB-TB condition. First, individuals scoring higher on zest may rate consistently lower desire to quit across time compared to individuals scoring lower on zest. Consistent with a multi-faceted view of resilience, a second possibility is that we may observe both an initial buffering and then an adaptive capacity emerging across time. Specifically, high zest individuals may rate lower desire to quit initially (i.e., a buffering) but subsequently increase their desire to quit to match low zest individuals as they also succumb to the sustained experience of heightened perceived burdensomeness and thwarted belongingness. However, in the latter stages of the task, high zest individuals may adapt to this aversive experience and again display an increase in persistence relative to low zest individuals (i.e., an adaptive capacity). Finally, a third possibility was that we would observe no buffering but instead an adaptive capacity during the latter stages of the task.

Method

Participants

Ninety-two undergraduate psychology students ($M_{age} = 19.84$ years, $SD = 6.01$, 66% female) scoring in the top and bottom 15% of the distribution on a measure assessing zest for life participated and received course credit. The high and low zest participants were then randomly assigned to either a high or low PB-TB condition. All procedures were approved by the University's Human Research Ethics Committee.

Experimental Task and Procedure

The Interpersonal Persistence Task is a three-player task that requires participants to judge whether two shapes presented randomly on screen are alike or different as quickly and as accurately as possible. Participants are informed that one point is awarded for a rapid and correct response and one point deducted for a slow or incorrect response. The aim of the task is to score as many points as possible, with points won and lost as an individual also going towards a cumulative team total. As a team, players are aiming to beat a target score which they are told is based on the average scores of previous teams who have completed the task in the past. Participants receive on-screen instructions and are given the opportunity to play a practice round prior to the main task. Perceived burdensomeness and thwarted belongingness are simultaneously induced using two manipulations.

Manipulation of Burdensomeness. Perceived burdensomeness is induced using performance feedback delivered after each round via a feedback table showing participants their own points won and lost, the points won and lost by their teammates, and the team target score. However, the scoring parameters of individual players are manipulated to ensure that participants in the high PB-TB condition always score significantly lower than their teammates (i.e., a 40% success rate), while those in the low PB-TB condition always score equal to or better than their teammates (i.e., a 60% success rate). Thus, participants in the high PB-TB condition are

encouraged to perceive they are not effectively contributing to their team's performance and are therefore a burden on their fellow players.

Manipulation of Belongingness. Thwarted belongingness is induced using interpersonal feedback statements. Participants are told they are playing with two fellow students, one in the room opposite and one in a laboratory down the hall. However, in reality these 'co-players' are both computer-controlled. To increase the plausibility that 'co-players' are fellow students, other participants are tested concurrently in adjacent computer booths, or otherwise a confederate of the researcher plays the part of a fellow participant. At six time points participants are given the opportunity to type a brief message to each 'co-player'. They are told prior to commencement that this feedback can enhance team performance. Once participants have typed their own feedback messages they receive pre-generated statements from their computer-controlled 'co-players'. In the high PB-TB condition these statements are increasingly critical and impatient (consistent with their continued decline in performance), while in the low PB-TB condition the statements are praising and supportive (consistent with their high performance). Thus, participants in the high PB-TB condition are encouraged to feel as though they are not valued by their teammates and therefore do not belong in the team.

The task runs for six blocks, each comprising three rounds of five trials. After each of the six blocks participants are asked to rate the extent to which they feel they are a burden on the team (burdensomeness), the extent to which their teammates make them feel like they belong in the team (belongingness), and their current desire to drop out of the task (persistence). Responses are made on a Likert scale ranging from 0 (*not at all true for me*) to 6 (*very true for me*), with higher scores indicating greater burdensomeness, belongingness, and desire to quit. Finally,

participants rate the extent to which they were interested in and made an effort to do well on the task retrospectively upon completion, again on a 7-point scale.

Following the main task participants completed a questionnaire battery delivered using online software. A suspicion probe consisting of two written questions (*'Do you have any comments about the experiment?'* and *'Do you have any comments about your teammates?'*) was administered upon completion and prior to the debriefing in order to identify any participants who suspected their 'co-players' were not real. These questions were deliberately oblique and open-ended to minimize the chance that participants would indicate suspicion simply to reduce their negative affect experienced during the high PB-TB condition; that is, assuming the 'nasty' co-players were not real would provide some subjective relief from the discomfort. At debriefing (following the suspicion probe) participants were informed that they had been playing with computer-generated teammates and given details of available support services.

Questionnaires

Zest for Life Scale (ZLS; George, Stritzke, Page, & Brown, 2016). The ZLS is a 12-item measure covering two dimensions: (1) general zest (comprising general desire to live and positive outlook on life) and (2) engagement (reflecting current engagement with life). Agreement with questions such as 'I am embracing life' and 'I try to enjoy life no matter what' is rated on a 9-point Likert scale with responses ranging from 0 (*not all all*) to 8 (*very strongly*), with higher scores indicating greater zest for life. Internal consistency reliability in the current sample was excellent ($\alpha = .98$). The scale was administered initially for screening purposes and again during the testing phase to determine the reliability of the zest grouping. The correlation between the two administrations was high ($r = .94$), suggesting the scale provides a stable measure of this trait over time. Zest was positively associated with meaning in life ($r = .77, p <$

.001) and negatively associated with suicide intent ($r = -.39, p < .001$), likelihood ($r = -.32, p = .002$) and readiness ($r = -.39, p < .001$) for suicide, and suicide ideation ($r = -.59, p < .001$).

Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006). The 10-item MLQ has two subscales assessing the presence of, and search for, meaning in life. Only the presence subscale was included in the current study. The MLQ requires participants to rate agreement with items such as ‘I understand my life’s meaning’ on a 7-point Likert scale, ranging from 1 (*absolutely untrue*) to 7 (*absolutely true*). The scale has good psychometric properties (Steger et al., 2006; Steger & Kashdan, 2007) and internal consistency in the current sample was high ($\alpha = .90$).

Interpersonal Needs Questionnaire (INQ; Van Orden et al., 2012). The INQ is a 15-item measure with two sub-scales assessing base-level perceived burdensomeness and thwarted belongingness. It has good psychometric properties (Van Orden et al., 2008). Participants rate their agreement with statements such as ‘The people in my life would be better off if I were gone’ (burdensomeness) and ‘I rarely interact with people who care about me’ (thwarted belongingness) on a 7-point Likert scale ranging from 0 (*not at all true for me*) to 6 (*very true for me*), with higher scores indicating greater perceived burdensomeness and thwarted belongingness. Internal consistency in the current sample was high for both burdensomeness ($\alpha = .95$) and belongingness ($\alpha = .93$) scales.

Kessler Psychological Distress Scale (K-10; Kessler et al., 2002). The K-10 is a 10-item measure of general psychological distress that can distinguish individuals with a mood disorder from those without. It has good psychometric properties in non-clinical samples (Kessler et al., 2002). Items relating to mood disorder symptoms such as ‘About how often do you feel nervous?’ and ‘About how often do you feel depressed?’ are rated on a 5-point Likert scale

ranging from 1 (*all of the time*) through to 5 (*none of the time*). All items are reverse scored such that higher scores indicate greater psychological distress. Normative bands for K10 scores in Australia are: low distress (10-15), moderate distress (16-21), high distress (22-29), and very high distress (30-50; Cvetkovski, Reavley, & Jorm, 2012). Internal consistency reliability in the current sample was good ($\alpha = .91$).

Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock, Holmberg, Photos, & Michel, 2007). An item assessing suicidal ideation was derived from the SITBI and required participants to indicate the number of times they had thought about suicide over the past 12 months, ranging from 0 (*never*) to 5 (*almost every day*). While the SITBI is traditionally administered as a structured interview, a self-report format is psychometrically sound (Latimer, Meade, & Tennant, 2013).

Intent, Likelihood, and Readiness for Suicide. Intent, likelihood, and readiness for suicide were assessed using three items (“*I have no intention of killing myself in the near future*”, “*It is very unlikely that I would die by suicide anytime soon*”, and “*If I wanted to kill myself, I feel ready to do so*”) measured on a 9-point scale ranging from 0 (*agree not at all*) to 8 (*agree very strongly*). The intention and likelihood items are reverse-scored, such that higher scores suggest increased intention and likelihood for suicidal behavior.

Results and Discussion

Data-Analytic Strategy

Manipulation checks first identified participants who were suspicious of the procedure and then those that had switched zest groups between the screening and testing phases. Several potential confounding variables that required controlling for in the main analyses were also

identified. The effects of the manipulation of burdensomeness, belongingness, and zest, on desire to quit ratings were then examined using 2 (high/low PB-TB condition) \times 2 (high/low zest group) \times 6 (time blocks 1-6) mixed-design analyses of variance (ANOVAs). Significant interaction effects were investigated using follow-up contrasts. Main and interaction effects involving time were further examined using linear trend analyses. This would reveal if induction effects were successfully sustained or would even increase over the course of the task. The relative strength of the contribution of perceived burdensomeness and thwarted belongingness on desire to quit ratings, while controlling for confounding variables such as interest and effort in the task, was examined using hierarchical multiple regression.

Screening and Participant Characteristics

Data screening confirmed there were no significant univariate or multivariate outliers ($p < .01$) and measures were normally distributed (see Table 1). Mean levels of suicide risk variables (intent, likelihood, readiness, and ideation) were higher in low relative to high zest participants, as was base-level perceived burdensomeness and thwarted belongingness. Relative to a normative criteria (Cvetkovski et al., 2012), high zest participants reported moderate levels of psychological distress, while low zest participants reported very high distress. To control for the potential influence of psychological distress on task performance, K10 scores were added as a covariate in the analyses. Examination of the zest grouping at time of testing revealed two high zest participants no longer scored in the high range on the ZLS and removing them resulted in ranges that did not overlap (High zest: range = 6.25 – 8.00; Low zest: range = 0.67 – 6.00).

Manipulation Checks

The suspicion probe identified 20 participants who indicated they may have guessed the nature of the study's design and these cases were excluded. Examination of mean scores of players during the task confirmed that the scoring manipulation functioned as intended. That is, participants allocated to the high PB-TB condition scored significantly lower on average than their co-players during all six blocks, while those allocated to the low PB-TB condition scored better than their co-players. Participants in the high PB-TB condition were also significantly lower on effort, $t(61.06) = 2.66, p = .01, d = .34, CI (.08, .59)$, and interest, $t(69) = 4.67, p < .001, d = .56, CI (.30, .81)$, compared to those in the low PB-TB condition and therefore these variables were examined as covariates in subsequent analyses.

Perceived Burdensomeness. Descriptive statistics for burdensomeness ratings are displayed in Figure 1A. A mixed-design ANOVA examining the effects of condition and zest group on burdensomeness ratings over time confirmed the high PB-TB condition yielded significantly higher levels of perceived burdensomeness overall compared to the low PB-TB condition, $F(1,66) = 134.96, p < .001, \eta^2_{\text{partial}} = .67, CI (.56, .74)$. There was also a significant Time \times Condition interaction, $F(5,62) = 3.12, p = .014, \eta^2_{\text{partial}} = .20, CI (.03, .29)$. Following up the Time \times Condition interaction revealed that burdensomeness ratings dropped significantly across time in the low PB-TB condition, $F(1,34) = 12.82, p = .001, \eta^2_{\text{partial}} = .27, CI (.08, .44)$ but remained at a stable high level in the high PB-TB condition, $F(1,32) = 2.71, p = .11, \eta^2_{\text{partial}} = .08, CI (0, .24)$. A significant effect of zest group, $F(1,66) = 5.53, p = .022, \eta^2_{\text{partial}} = .077, CI (.01, .19)$ revealed high zest participants reported lower burdensomeness compared to low zest individuals, irrespective of condition. No other main or interaction effects were significant. Thus, perceived burdensomeness was successfully induced in the high PB-TB condition by the end of the first block and remained at this high level throughout the remainder of the task.

Thwarted Belongingness. Descriptive statistics for belongingness ratings are displayed in Figure 1B. A mixed-design ANOVA examining the effects of condition and zest group on belongingness ratings across time confirmed participants in the high PB-TB condition reported significantly lower belongingness compared to those in the low PB-TB condition, $F(1,66) = 158.80, p < .001, \eta^2_{\text{partial}} = .71, CI (.60, .77)$. There was also a significant main effect of time, $F(5,62) = 12.29, p < .001, \eta^2_{\text{partial}} = .50, CI (.31, .58)$ and a significant Time \times Condition interaction, $F(5,62) = 15.34, p < .001, \eta^2_{\text{partial}} = .55, CI (.37, .62)$. Following up the Time \times Condition interaction revealed belongingness ratings increased slightly across time in the low PB-TB condition, $F(1,34) = 4.28, p = .046, \eta^2_{\text{partial}} = .11, CI (.01, .29)$ but dropped substantially across time in the high PB-TB condition, $F(1,32) = 36.25, p < .001, \eta^2_{\text{partial}} = .53, CI (.31, .66)$. There were no other significant main or interaction effects ($p > .05$). Thus, thwarted belongingness was successfully induced in the high PB-TB condition by the end of block one and continued to increase across time¹.

Persistence

Descriptive statistics for desire to quit (persistence) ratings are displayed in Figure 1C. A mixed-design ANOVA examining the effects of condition and zest group on persistence ratings across time confirmed that participants in the high PB-TB condition reported greater desire to quit relative to those in the low PB-TB condition, $F(1,66) = 80.57, p < .001, \eta^2_{\text{partial}} = .55, CI (.41, .64)$. There was also a significant main effect of time, $F(5,62) = 7.64, p < .001, \eta^2_{\text{partial}} = .38, CI (.18, .47)$, a significant effect of zest group, $F(1,66) = 5.62, p = .021, \eta^2_{\text{partial}} = .08, CI (.01, .19)$, and significant Time \times Condition, $F(5,62) = 11.75, p < .001, \eta^2_{\text{partial}} = .49, CI (.29,$

¹ Additional analyses confirmed the same large effects of condition were evident for both burdensomeness ($F(1,88) = 156.35, p < .001, \eta^2_{\text{partial}} = .64$) and belongingness ($F(1,88) = 239.76, p < .001, \eta^2_{\text{partial}} = .73$) when suspicious participants were included. Nevertheless, these cases were excluded to minimize the possibility of demand characteristics.

.57), and Zest \times Condition interaction effects, $F(1,66) = 4.10, p = .047, \eta^2_{\text{partial}} = .06, CI (.01, .17)$. Follow-up tests revealed no significant main or interaction effects in the low PB-TB condition, however in the high PB-TB condition there was a significant effect of time, linear trend, $F(1,32) = 13.56, p = .001, \eta^2_{\text{partial}} = .30, CI (.09, .47)$, and a significant effect of zest group, $F(1,32) = 5.71, p = .023, \eta^2_{\text{partial}} = .15, CI (.01, .33)^2$. Thus, while participants in the low PB-TB condition remained at a stable low level of desire to quit, those in the high PB-TB condition increased significantly in desire to quit across time. Moreover, within the high PB-TB condition participants who were higher in zest for life reported significantly lower desire to quit compared to participants who were low on this resilience factor.

To examine the relative contributions of burdensomeness and thwarted belongingness to desire to quit within the high PB-TB condition, a hierarchical multiple regression analysis was conducted. Mean interest and effort ratings were entered in step one as covariates and the remaining variables were entered in step two. Effort and interest in the task did not significantly influence persistence ratings, $F(2,31) = 2.82, p > .05$, but perceived burdensomeness and thwarted belongingness explained an additional 48.2% of the variance, $F(4,29) = 12.68, p < .001$, with the effect size for burdensomeness twice as large as for belongingness (Table 2).

What is the Relationship Between Task Persistence and Suicide Risk? Higher desire to quit the task was associated with higher likelihood for suicide ($r = .29, p = .017$). The positive association between desire to quit and suicidal intent was also just shy of statistical significance ($r = .24, p = .052$). The correlations between desire to quit and suicide ideation over the past 12

² Interest, effort, and K10 scores were added as covariates on the mixed-model ANOVAs examining the effects of condition and zest group on burdensomeness, belongingness, and persistence ratings. However, given this did not substantively alter the pattern of effects, the ANOVAs have been reported without these covariates.

months ($r = .04, p = .75$), and desire to quit and readiness for suicide ($r = .05, p = .67$), were non-significant.

In sum, elevated levels of the interpersonal risk constructs perceived burdensomeness and thwarted belongingness resulted in greater desire to quit the Interpersonal Persistence Task as predicted. However, burdensomeness was a much stronger contributor. Results also revealed a consistent buffering effect across time in high zest individuals within the high PB-TB condition.

Study 2

While Study 1 supports the notion that higher levels of pre-existing zest for life may confer resilience against the impact of induced feelings of perceived burdensomeness and thwarted belongingness, this finding has limited relevance to intervention strategies seeking to strengthen resilience to the adverse experience of elevated levels of these interpersonal risk factors. In Study 2 we therefore turned our attention to *acute* or *malleable* forms of resilience that may be promoted to mitigate the decline in persistence, irrespective of pre-existing resilience. One trainable skill (Brown, Ryan, & Creswell, 2007) that holds promise as an attribute that may confer resilience to interpersonal antecedents to suicide risk is mindfulness; the ability to pay attention non-judgmentally to present-moment experience (Williams & Swales, 2004). Research suggests that mindfulness may enhance engagement with life by increasing vitality, vigor, and curiosity towards experiences (Baer & Lykins, 2011; Niemiec, Rashid, & Spinella, 2012) and by increasing one's ability to cope with adversity and continue striving for longer term goals (Erisman & Roemer, 2010; Teper, Segal, & Inzlicht, 2013).

According to the interpersonal theory, a desire for suicide emerges when an individual feels unable to persist with life in the face of thwarted interpersonal needs. Given mindfulness

may enhance engagement with life and increase one's capacity to self-regulate in response to adversity, training in this skill may increase persistence in the face of elevated perceived burdensomeness and thwarted belongingness. Thus, in Study 2 we examined the potential buffering effects of experimentally induced state mindfulness by using an established brief induction procedure (i.e., focused breathing; Arch & Craske, 2006) prior to completion of the Interpersonal Persistence Task. We also examined whether the protective effects of induced mindfulness would differ between individuals already higher or lower on baseline zest for life.

Participants were recruited based on individual differences in zest for life, and the Interpersonal Persistence Task was used to induce high levels of perceived burdensomeness and thwarted belongingness. All participants were allocated to the high PB-TB condition, however prior to commencing the task participants were randomly assigned to receive either a mindfulness induction (MI) or an unfocused attention (UA) control induction (Arch & Craske, 2006). It was predicted that the MI would confer an acute form of resilience that would increase persistence in the face of interpersonal adversity. Specifically, participants in the MI condition would display a stable low level of desire to quit across time relative to the UA controls despite rating equivalent high levels of perceived burdensomeness and thwarted belongingness. Additionally, given high zest individuals possess higher baseline resilience and are therefore already buffered against the deleterious effects of elevated burdensomeness and diminished belongingness on persistence, we predicted they would be affected by the mindfulness induction to a lesser degree compared to low zest individuals. Specifically, our induced form of acute resilience would dilute the zest group differences seen in Study 1, such that the difference on the desire to quit variable would be diminished between high and low zest individuals.

Method

Participants

Fifty-two undergraduate psychology students ($M_{age} = 19.48$ years, $SD = 3.24$, 54% female) scoring in the top or bottom 15% of the distribution on the ZLS participated in exchange for course credit. Both high and low zest groups were allocated to the high PB-TB condition and then randomly assigned to receive either the MI or UA induction. Procedures were approved by the University's Human Research Ethics Committee.

Materials

Zest for Life Scale (ZLS; George et al., 2016). The ZLS (as described in Study 1) was again administered to confirm the validity of the zest grouping. Internal consistency reliability was excellent ($\alpha = .98$) in the current sample.

Procedure

The procedure resembled Study 1, with the exception that participants completed an induction exercise at their separate computers prior to commencing the Interpersonal Persistence Task. Participants were told this was an exercise designed to prepare them for the computerized task and to follow the instructions as best they could. Each exercise consisted of a short page of written information and a 10-minute audio recording delivered via headphones.

Mindfulness Induction (MI). The MI is adapted from the induction procedure of Arch and Craske (2006) and uses a focused breathing audio exercise based on techniques used in Mindfulness Based Stress Reduction (Kabat-Zinn, 1992) and Mindfulness Based Cognitive Therapy (Segal, Williams, & Teasdale, 2002). After initial instruction, participants are presented with a written sheet that describes mindfulness and its positive influence on psychological wellbeing (adapted from Erisman & Roemer, 2010). They then complete the focused breathing

exercise which requires them to sit comfortably in their chair and focus their attention on the sensations of the breath. When any thoughts, emotions, or physical sensations arise participants are told to note them non-judgmentally and gently bring their awareness back to the breath. This procedure approximates more extensive mindfulness training and has been used successfully in a range of laboratory studies to date (Arch & Craske, 2006; Erisman & Roemer, 2010; Hooper, Davies, Davies, & McHugh, 2011; McHugh, Procter, Herzog, Schock, & Reed, 2012).

Unfocused Attention (UA) Control Induction. The UA control induction is also adapted from Arch and Craske (2006) and requires participants to let their thoughts flow as they normally would throughout the day. This exercise is proposed to reflect baseline awareness where an individual, in the absence of stimulus-driven attention, allows their mind to wander freely (i.e., the opposite of mindfulness where attention is directed purposively; Mason et al., 2007). Participants read written instructions explaining how thoughts of the past and future can negatively influence the way we feel in the present (adapted from McHugh et al., 2012) and so in the current exercise they will not allow their mind to dwell on any one thought in particular, but rather let their thoughts roam freely. The aim here was to set a similar positive expectation to the MI instructions which emphasize the positive impact of mindfulness on wellbeing. The UA audio recording is matched as closely as possible to the MI induction audio, including the tone and style of the verbal instructions, and repeats instructions approximately every 60 seconds.

After the induction participants completed the Interpersonal Persistence Task in their same testing cubicles. Following the task the suspicion probe (as described in Study 1) was administered. At this point participants were also asked to rate their agreement with the statements (1) *I found the preparation exercise instructions clear enough to understand* and (2) *I*

attempted to follow the preparation exercise instructions. These were rated on a 7-point Likert scale, ranging from 0 (*not at all*) to 6 (*very strongly*). Participants were then fully debriefed.

Results and Discussion

Data-Analytic Strategy

Manipulation checks first accounted for any suspicion, changes in zest grouping, or non-compliance with the induction procedure instructions. The effects of the two induction procedures and zest groupings on burdensomeness, belongingness, and desire to quit ratings were then examined using 2 (MI/UA condition) \times 2 (high/low zest group) \times 6 (time blocks 1-6) mixed-design ANOVAs. Main and interaction effects involving time were further examined using linear trend analyses. This would reveal if induction effects were sustained, increased, or diminished during the task. Because mindfulness is not expected to prevent the initial experience of adversity, but rather acts as a coping mechanism while the adversity unfolds and then enhances persistence despite the adversity, we further clarified the impact of the induction procedures on task persistence over time by performing follow-up linear trend analyses split across the initial (Block 1 to Block 4) and latter (Block 4 to Block 6) stages of the task. This would reveal if the effect of the mindfulness induction is apparent throughout the task or would be more pronounced in the latter stage of the task.

Screening and Participant Characteristics

Data screening confirmed there were no univariate or multivariate outliers ($p < .01$) and measures were normally distributed. Mean zest for life ratings were comparable to Study 1 (High zest group: $M = 7.13$, $SD = .92$; Low zest group: $M = 3.22$, $SD = 1.44$). Examination of the zest grouping revealed one high zest participant and one low zest participant no longer scored in their

respective ranges on the ZLS and removing them resulted in ranges that did not overlap (High zest: range = 5.33 – 8.00; Low zest range = 0.58 – 4.83).

Manipulation Checks

The suspicion probe identified 14 participants who were excluded. Two participants who did not engage with the induction procedure (based on observations during testing and ratings lower than three on the question assessing attempt to follow instructions) were also excluded. Mean ratings on the preparation exercise questions confirmed participants understood the instructions ($M = 5.52$, $SD = .75$) and attempted to follow them ($M = 5.44$, $SD = .79$).

Burdensomeness and Belongingness. Mixed-design ANOVAs revealed significant linear trends on both measures, confirming burdensomeness ratings increased across time, $F(1,30) = 10.87$, $p = .003$, $\eta^2_{\text{partial}} = .27$, $CI (.06, .44)$, while ratings of belongingness dropped across time, $F(1,30) = 100.98$, $p < .001$, $\eta^2_{\text{partial}} = .77$, $CI (.63, .83)$. No other main or interaction effects were significant ($p > .05$), indicating levels of these risk constructs were equivalent across both high/low zest groups and MI/UA conditions. Results have therefore been displayed in Figure 2 collapsed across zest groups.

Persistence

A mixed-design ANOVA comparing the effects of group and attention conditions on persistence ratings across time revealed a significant main effect of time, $F(5,26) = 4.96$, $p = .003$, $\eta^2_{\text{partial}} = .49$, $CI (.14, .58)$, and a significant Time \times Condition interaction, $F(5,26) = 3.15$, $p = .023$, $\eta^2_{\text{partial}} = .38$, $CI (.04, .48)$. Follow-up linear trend analyses revealed desire to quit increased significantly across time in the UA condition, $F(1,16) = 49.41$, $p < .001$, $\eta^2_{\text{partial}} = .76$, $CI (.51, .84)$, but remained at a stable low level in the MI condition, $F(1,14) = 1.82$, $p = .20$, η^2

$\eta^2_{\text{partial}} = .12$, $CI(0, .36)$ ³. Finally, the three-way interaction between time, attention condition, and zest group was not significant ($p = .11$), nor was the main effect of zest group ($p = .39$), indicating the response pattern was similar across high and low zest individuals. Given there were no significant differences between high and low zest individuals, mean persistence ratings have been displayed collapsed across zest groups (Figure 2).

To further clarify the protective effects of the MI induction, follow-up analyses were run in the initial versus latter stages of the task. This confirmed the MI/UA Condition \times Time interaction effect was significant between Time 4 and Time 6, $F(2,29) = 7.82$, $p = .002$, $\eta^2_{\text{partial}} = .35$, but not between Time 1 and Time 4, $F(3,28) = .62$, $p = .61$, $\eta^2_{\text{partial}} = .06$. Moreover, the effect size for the linear trend in the MI condition was small between Time 1 and Time 4 ($\eta^2_{\text{partial}} = .17$) and non-existent between Time 4 and Time 6 ($\eta^2_{\text{partial}} = .001$). In contrast, the effect size for the linear trend in the UA condition was large both between Time 1 and Time 4 ($\eta^2_{\text{partial}} = .55$) and Time 4 and Time 6 ($\eta^2_{\text{partial}} = .56$). Thus, while the mindfulness induction had a protective influence across the entire span of the task, the action appeared to be most pronounced in the latter part of the procedure.

In sum, participants in the MI condition remained at a stable low level of desire to quit throughout the task compared to participants in the UA condition who diminished in persistence over time. State mindfulness increased persistence in the face of heightened perceived burdensomeness and thwarted belongingness, irrespective of pre-existing zest for life.

General Discussion

³ Interest and effort were again added as covariates on all mixed-model ANOVAs. Given this did not alter the pattern of effects, results have been reported without these covariates.

As predicted, Study 1 revealed induced burdensomeness and thwarted belongingness had a deleterious impact on task persistence compared to a condition where these risk constructs were not induced. Complementing previous non-experimental research, these findings provide experimental evidence bearing upon the posited causal effects of perceived burdensomeness and thwarted belongingness on desire to escape from adversity when fundamental interpersonal needs are thwarted (Deci & Ryan, 2000). In addition, participants in the high PB-TB condition who were higher on pre-existing zest for life were buffered against these impairments in persistence over all six blocks relative to participants who were low on this resilience factor. Given a literature showing that individuals with stronger life-oriented beliefs are less likely to exhibit suicidality (Harrison et al., 2014; Johnson et al., 2011; Linehan, Goodstein, Nielsen, & Chiles, 1983), our data provide experimental support for zest as a time-limited resilience factor. To the extent that the attenuating effect of zest for life parallels other life-oriented beliefs, it could serve to dampen the relationship between the risk variables of the interpersonal theory and their erosive effects on persistence as a potential antecedent to suicidal desire. An extended buffering effect as observed suggests that not only are zestful individuals better able to persist despite experiencing high levels of perceived burdensomeness and thwarted belongingness, this resilience is sustained over time for the duration of the experiment.

The multiple regression analysis revealed that, consistent with the interpersonal theory, both perceived burdensomeness and thwarted belongingness contributed to the impairments in persistence observed in Study 1, above and beyond the influence of effort and interest in the task. However, burdensomeness was the stronger contributor. Previous cross-sectional evidence found perceived burdensomeness to be a more stable and robust predictor of suicidal desire (Christensen et al., 2014; Jahn, Van Orden, & Cukrowicz, 2013; Van Orden, Lynam, Hollar, &

Joiner, 2006; Van Orden et al., 2008), whereas the influence of thwarted belongingness may differ across samples (Cero et al., 2015). Hence, it is not unexpected that when these variables are manipulated experimentally, the effect of perceived burdensomeness on the dependent variable is stronger than thwarted belongingness.

Moving beyond pre-existing individual differences in resilience, Study 2 showed enhancing state mindfulness conferred an acute form of resilience that protected against impairments in persistence in the face of interpersonal adversity. As predicted, participants in the MI condition exhibited a stable low level of desire to quit across time relative to the UA controls who increased significantly in desire to quit from block one to block six. While the mindfulness induction conferred protection across the entire span of the task, this protective effect was strongest during the latter stages of the procedure. This is consistent with the notion that mindfulness enhances persistence in adversity; that is, it does not prevent the experience of adversity, but rather kicks in as a coping mechanism as the adversity unfolds. These findings are consistent with research showing that even short periods of mindfulness training can reduce emotional reactivity (Arch & Craske, 2010; Farb et al., 2010). Importantly, they complement previous work suggesting clinical interventions incorporating mindfulness training are associated with reduced risk for suicide (Forkmann et al., 2014).

Within their own frame of reference, the current findings support the notion that heightened perceptions of burdensomeness and thwarted belongingness have a significant detrimental impact on persistence. While quitting or desiring to quit a computer task is obviously very different from desiring to end one's own life, the current findings suggest that a decline in persistence and goal pursuit during interpersonal adversity experienced as thwarted satisfaction of the fundamental needs for competence and relatedness may motivate self-defeating

behaviours, which can impact on mental health and antecedents of suicide risk (Deci & Ryan, 2000; Van Orden et al., 2010).

Theoretical and Clinical Implications

Our studies have a number of theoretical and clinical implications. First, the observed detrimental effects of experimentally manipulated perceived burdensomeness and thwarted belongingness on desire to persist suggest that these constructs are causally related to persistence in an interpersonally challenging context. This is consistent with research showing that when fundamental needs for competence and relatedness are blocked, intrinsic motivation and persistence in goal-directed activities declines (Deci & Ryan, 1980; Ryan & Deci, 2000; Twenge, Catanese, & Baumeister, 2002; Vallerand & Reid, 1984). Further, in light of evidence suggesting perceived burdensomeness and thwarted belongingness mediate the relationship between thwarted interpersonal needs and suicidality (Tucker & Wingate, 2014), the current findings are consistent with the interpersonal theory's prediction that these constructs are causal factors underlying the desire to not persist with, and give up on, life. Second, if perceived burdensomeness and thwarted belongingness are in fact causal risk factors, then suicide prevention efforts should include strategies to mitigate their impact. Study 2 provided experimental support for mindfulness training as a resilience factor that may confer protection against impairments in persistence caused by heightened perceived burdensomeness and thwarted belongingness. One caveat to the use of mindfulness training within the context of suicide prevention (cf., Chesin et al., 2015) is the possibility of unintended negative consequences, such as encouraging patients to focus on their negative thoughts. However, this could be addressed by encouraging 'living talk' that can provide a counterbalancing focus on life-sustaining thoughts (Britton, 2015). Third, the observed buffering effects of zest for life

against potential antecedents of suicide risk suggests that theories of suicide need to shift from a sole focus on risk factors and better articulate how causal factors, such as perceived burdensomeness and thwarted belongingness, interact with resilience factors to moderate their impact. For instance, future research could examine whether, in addition to their direct effects on suicidal desire, these interpersonal risk factors also exert an indirect effect by diminishing zest for life over time. That is, whether zest for life is a proximal protective factor that is depleted when one perceives oneself to be a burden on, and disconnected from, others.

Limitations and Future Directions

The current studies had several limitations. First, while the mindfulness induction in Study 2 conferred stability on the persistence measure relative to controls, mean desire to quit ratings suggested that participants were also positively affected by the UA induction during the first four blocks of the task. Thus, it is possible the UA induction may have an active component, such as relaxation, that positively influences emotional reactivity (cf., Arch and Craske, 2006). Second, the joint induction of perceived burdensomeness and thwarted belongingness in the current studies limits the interpretation of any independent causal effects of these constructs on persistence. Specifically, while the multiple regression analysis provides insight into their relative contributions, it cannot be concluded that either construct in isolation would be sufficient to inhibit persistence on the task. The interpersonal theory proposes that the co-occurrence of perceived burdensomeness and thwarted belongingness leads to particularly heightened risk, but these constructs in isolation are also proposed to generate a less serious or passive form of suicidal desire (Van Orden et al., 2010). Thus, a task that differentially induces burdensomeness and thwarted belongingness would be a useful avenue for future research. Third, explicit questioning about perceptions of burdensomeness, belongingness, and desire to quit throughout

the task may have influenced the manner in which participants responded to the experimental manipulation. While the fact that large effects of condition were evident by the first rating interval mitigates this concern somewhat, demand effects are a possible confound. It should also be acknowledged that the suspicion probe administered post task consisted of open-ended questions that may have underestimated participants' hypotheses concerning the purpose of the experiment. Fourth, the absence of a mood measure is a limitation, as we were unable to clarify the impact of positive or negative affect on task performance. Further, in Study 2 it is possible that the mindfulness induction exerted a protective influence by altering mood, rather than by enhancing emotion regulation and non-reactivity. Finally, the smaller sample size in Study 2 limited the power to detect differences between high and low zest groups and hence the lack of an interaction involving group is difficult to interpret.

While Study 2 suggests that even brief mindfulness training may potentially mitigate the adverse effect of elevated perceived burdensomeness and thwarted belongingness in the short term, given that a number of studies have found clear differences between novice and more experienced mindfulness practitioners on measures of emotion regulation (Brefczynski-Lewis, Lutz, Schaefer, Levinson, & Davidson, 2007; Lutz et al., 2004), it remains to be seen whether greater practice brings greater benefit on the present experimental task. Future research may therefore examine the effects of more extensive mindfulness training on persistence, or differences between individuals who engage in a regular mindfulness practice versus those who do not. Finally, future research may also examine whether it is possible to attenuate the negative impact of perceived burdensomeness and thwarted belongingness on persistence once these risk factors have already taken their toll (e.g., during the task). Such a study may have even greater implications for clinical practice where at-risk individuals present with elevated levels of

perceived burdensomeness and thwarted belongingness (cf., Levi-Belz & Gamliel, 2015) and require intervention to reduce their impact on the transition from suicidal desire to behavior.

In conclusion, the present findings provide experimental support that complements research investigating the role of perceived burdensomeness and thwarted belongingness in the causal pathway to suicide as proposed by the interpersonal theory. Results also reinforce the notion that contemporary theories of suicide, including the interpersonal theory, must better account for the interplay between risk and resilience factors. Trait zest for life and state mindfulness attenuated the deleterious impact of perceived burdensomeness and thwarted belongingness on task persistence. Thus, assessing levels of zest in routine clinical practice may increase the accuracy of suicide risk assessment, while mindfulness training may be a useful intervention strategy enabling at-risk individuals to persist with living in the face of elevated perceptions that fundamental interpersonal needs are not satisfied.

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Table 1.

General Sample Descriptives for Study 1 Split by Zest Group.

	High Zest (N=46)		Low Zest (N=45)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Zest for life	7.15	.89	3.34	1.30
Meaning in life	4.76	1.26	2.92	1.16
Perceived burdensomeness	.30	.49	1.87	1.18
Thwarted belongingness	.91	.73	2.69	1.07
Psychological distress	18.11	4.05	30.96	6.15
Suicide intent	.44	1.69	1.48	2.12
Likelihood for suicide	.44	1.70	1.22	1.99
Readiness for suicide	1.56	1.88	3.11	2.45
Suicide ideation	1.42	.66	2.76	1.39

Table 2.

Hierarchical Multiple Regression Within the High PB-TB Condition in Study 1 with Mean Desire to Quit (Persistence) as the Outcome Variable, Interest and Effort Entered in Step 1, and Burdensomeness and Belongingness Entered in Step 2.

	<i>b</i>	SE <i>b</i>	95% Confidence Intervals		β	R^2	R^2 Change
Step 1						.15	
Effort	-.07	.32	-.68	-.01	-.04		
Interest	-.34	.17	-.71	.58	-.37*		
Step 2						.64**	.48**
Effort	-.22	.22	-.66	.23	-.12		
Interest	-.21	.12	-.44	.03	-.22		
Burdensomeness	.75	.14	.46	1.04	.62**		
Belongingness	-.44	.22	-.89	.01	-.24 ⁺		

* $p < .05$, ** $p < .01$, ⁺ $p = .053$, $N = 34$

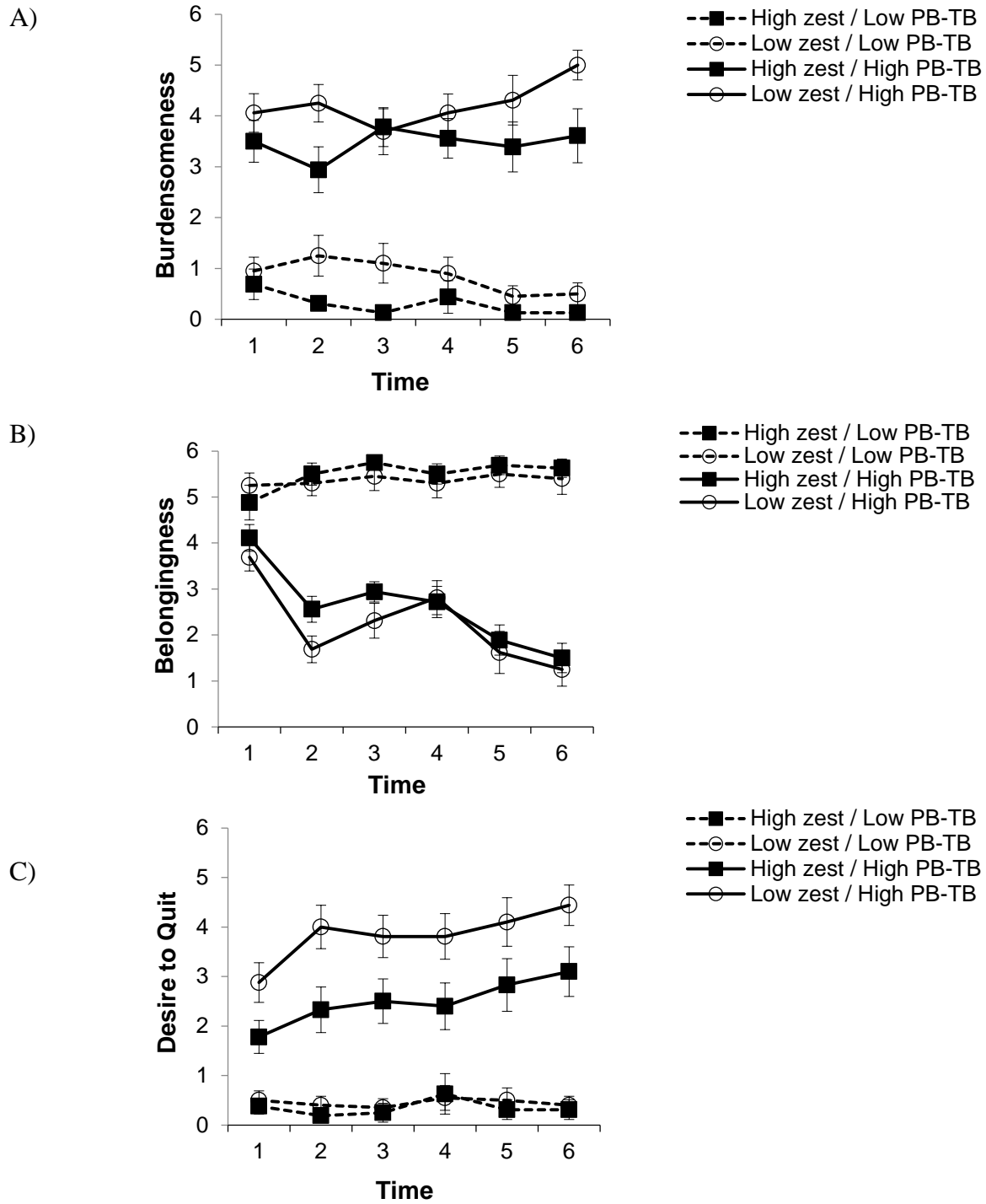


Figure 1. Interpersonal Persistence Task ratings in Study 1. Panel A) shows mean burdensomeness, Panel B) shows mean belongingness and Panel C) shows mean desire to quit (persistence). Error bars represent standard error of the mean.

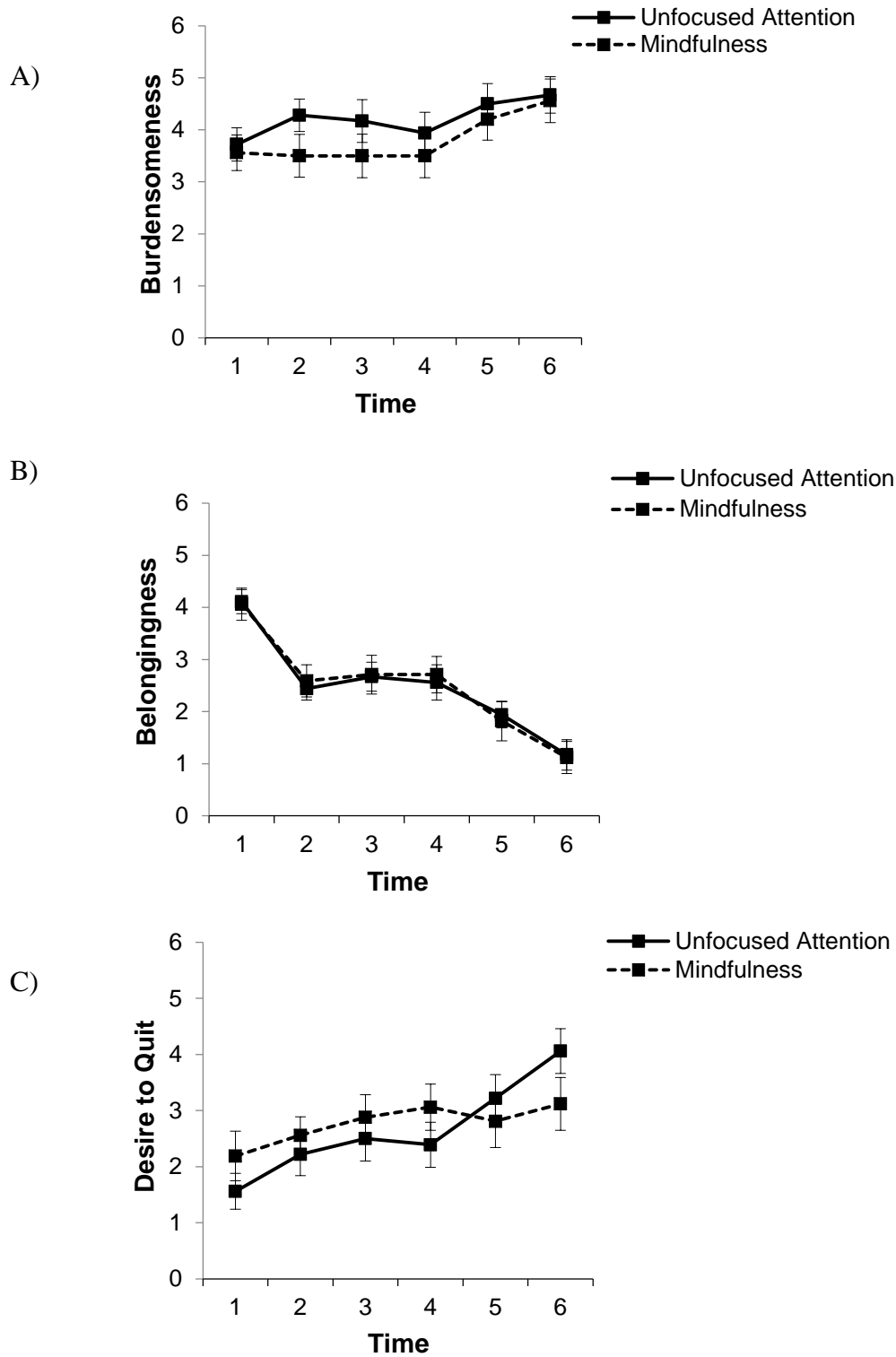


Figure 2. Interpersonal Persistence Task ratings in Study 2 collapsed across zest groups. Panel A) shows mean burdensomeness, Panel B) shows mean belongingness, and Panel C) shows mean desire to quit (persistence). Error bars represent standard error of the mean.